

CLAIMS

We claim:

1. A disk drive adapted for use with a disk cartridge,

the disk cartridge comprising: a disk; a body to store the disk therein; a window, which is provided for the body to allow a head to access the disk to read and/or write data from/on the disk; a shutter for opening or shutting the window; and a rotational member, which includes a gear portion and first and second notched portions to sandwich the gear portion and which interlocks with the shutter,

wherein the disk drive comprises:

a motor for spinning the disk;

10 a transporting portion for holding and transporting the disk cartridge between a position where the motor is ready to spin the disk and a position where the disk cartridge is loaded into, or unloaded from, the disk drive;

the head for reading and/or writing the data; and

15 a shutter driving mechanism, which includes a rack portion that engages with the gear portion, and first and second driving levers that are supported to fit into, and turn with, the first and second notched portions, respectively,

wherein the transporting portion includes a first cam structure for driving the first and second driving levers of the shutter driving mechanism such that the first and second driving levers swing as the transporting portion moves, and

20 wherein as the transporting portion moves, the first and second notched portions and the gear portion of the disk cartridge held on the transporting portion get engaged with the shutter driving mechanism, which then rotates the rotational member so as to open or close the shutter.

25 2. The disk drive of claim 1, wherein the first and second driving levers are supported in rotatable positions on the rack portion.

3. The disk drive of claim 1, wherein the first and second driving levers include fitting portions to fit into the first and second notched portions, respectively, and

wherein the shutter driving mechanism includes a first force applying structure for applying elastic force to the first and second driving levers such that the fitting portions of the first and second driving levers are pressed toward the transporting portion.

5 4. The disk drive of claim 1, wherein the shutter driving mechanism further includes: a base portion for supporting the rack portion such that the rack portion is movable perpendicularly to the direction in which the transporting portion is transported; and a second force applying structure for applying an elastic force to the rack portion toward the transporting portion.

10 5. The disk drive of claim 4, wherein the transporting portion includes a second cam structure for driving the rack portion perpendicularly to the transporting direction.

6. The disk drive of claim 5, wherein the transporting portion has a side surface that is opposed to the shutter driving mechanism and that includes the first and second cam structures thereon.

15 7. The disk drive of claim 1, wherein the transporting portion has a guide wall for holding the disk cartridge at a predetermined position.

20 8. The disk drive of claim 1, wherein the first cam structure has a first guide surface that contacts with the first and second driving levers.

9. The disk drive of claim 8, wherein the second cam structure has a second guide surface that contacts with the rack portion.

25 10. The disk drive of claim 9, wherein the transporting portion has a side surface opposed to the shutter driving mechanism, and the first and second guide surfaces are provided parallel to each other on the side surface of the transporting portion.

11. The disk drive of claim 3, wherein the first cam structure drives the first and second driving levers such that the fitting portions of the first and second driving levers fit with only the first and second notched portions without contacting with any other portion of the side surface of the disk cartridge.

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12. The disk drive of claim 1, wherein the shutter driving mechanism includes a guide rib for guiding the transporting portion.

13. The disk drive of claim 12, wherein the guide rib is provided for the rack portion.

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14. The disk drive of claim 12, wherein the guide rib is provided for the base portion.

15. The disk drive of claim 1, wherein a pitch as measured from the first notched portion of the rotational member to either a tooth or a groove, which is located at one end of the gear portion closest to the first notched portion, is equal to a pitch as measured from the fitting portion of the first driving lever to either a groove or a tooth, which is located at one end of the rack portion closest to the first driving lever.

16. The disk drive of claim 1, wherein a pitch as measured from the second notched portion of the rotational member to either a tooth or a groove, which is located at one end of the gear portion closest to the second notched portion, is equal to a pitch as measured from the fitting portion of the second driving lever to either a groove or a tooth, which is located at one end of the rack portion closest to the second driving lever.

25 17. The disk drive of claim 1, wherein a pitch as measured from the second notched portion of the rotational member to either a tooth or a groove, which is located at one end of the gear portion closest to the second notched portion, is longer by one tooth than a pitch as measured from the fitting portion of the second driving lever to either a groove or a tooth, which is located at one end of the rack portion closest to the second driving lever.

18. The disk drive of claim 1, wherein the first and second driving levers are arranged in the shutter driving mechanism, and one tooth of the rack portion, which is located closest to the second lever, is chamfered, such that as the shutter of the disk cartridge is going to be closed, the second lever 5 gets interlocked with the rotational member of the disk cartridge earlier than the first lever.

19. The disk drive of claim 1, wherein the force applied by the second force applying structure is greater than that applied by the first force applying structure.

10 20. The disk drive of claim 1, wherein the first cam structure drives the first and second driving levers such that as the transporting portion is going to load the disk cartridge into the disk drive, the first driving lever, the rack portion and the second driving lever contact with the rotational member of the disk cartridge in this order.

15 21. The disk drive of claim 5, wherein the first cam structure drives the first and second driving levers, and the second cam structure drives the rack portion, such that as the transporting portion is going to load the disk cartridge into the disk drive, the first driving lever, the rack portion and the second driving lever contact with the rotational member of the disk cartridge in this order.

20 22. The disk drive of claim 21, wherein while the transporting portion is unloading the disk cartridge from the disk drive, the rack portion is able to engage with the gear portion at least in first and second positions, and wherein no matter whether the rack portion has engaged with the gear portion in the first position or the second position, the shutter is closable.

25 23. The disk drive of claim 1, wherein after the shutter of the disk cartridge has been opened, the first and second driving levers are driven so as to avoid contact with the disk cartridge.

24. The disk drive of claim 23, wherein after the shutter of the disk cartridge has been opened, the rack portion is driven so as to avoid contact with the disk cartridge.

25. The disk drive of claim 1, wherein after the shutter of the disk cartridge has been either opened or closed, the transporting portion moves a predetermined distance.

5 26. The disk drive of claim 1, wherein the transporting portion has a recess on which another disk cartridge, having a different shape from that of the disk cartridge, is mountable.

10 27. The disk drive of claim 1, wherein the disk cartridge includes a locking member for keeping the rotational member from rotating, and wherein the first cam structure drives the first and second driving levers such that the first and second driving levers avoid contact with the locking member.